

**LIGHT TRAP COLLECTIONS OF THREE INTRODUCED  
*CONODERUS* SPECIES (COLEOPTERA: ELATERIDAE)  
IN SOUTHERN CALIFORNIA**

M. W. STONE<sup>1</sup>

131 Sir Damas Drive, Riverside, California 92507

AND

J. WILCOX<sup>1</sup>

7551 Vista Del Sol, Anaheim, California 92807

---

This paper is a continuation and the final results of trapping studies involving three introduced elaterids. All belong to the genus *Conoderus*, namely *exsul* (Sharp) the sugarcane wireworm, *falli* (Lane) the southern potato wireworm, and *amplicollis* (Gyllenhal) the Gulf wireworm. All are destructive to various vegetable and field crops. Previous papers (Stone, 1975, 1976a, b; Stone and Wilcox, 1979a, b) presented data on the distribution of these pests in California, on preliminary trapping results, and on life history studies conducted at Riverside.

The traps employed were 15 watt survey type fluorescent black light. One was located at Riverside adjacent to a bare field formerly planted to citrus and another in an avocado grove at Olive, Orange County, California 30 miles west of Riverside. The four year totals at Riverside (Table 1) show that 57% of the sugarcane wireworm adults were trapped during July–August and in the same period 65% at Olive. Totals for June to September at both locations were lower but similar. These months usually have the highest evening temperatures. At Riverside, *C. exsul* adults were trapped as early as May 8 in 1978 and as late as November 27 in 1977. Early and late emergence at Olive occurred on May 12, 1978 and on November 17, 1979. Of interest was that the four year totals show 4500 more adults being collected at Olive where the soil is not especially favorable for larval development.

The Gulf wireworm *Conoderus amplicollis* was recorded as a pest of vegetables in Alabama in 1927 (Cockerham and Deen, 1936) and subsequently discovered in Los Angeles County, California in 1938. Data regarding its spread and life history studies have been reported on by Stone and Wilcox (1979a). In previous trapping studies at Riverside and Olive in 1974–76 only 180 and 94 adults, respectively, were collected the entire season. As shown in Table 2, low totals were also obtained in the four later years in Riverside whereas at Olive, except in 1980, there was a substantial increase in numbers in 1977–79. The earliest record of emergence, June 9, occurred in 1977 and

Table 1. Monthly and yearly totals of *Conoderus exsul* (Sharp) adults collected at black light traps, Riverside and Olive, California.

	May	June	July	Aug	Sept.	Oct.	Nov.	Total
Riverside								
1977	13	313	899	1124	370	381	0	3100
1978	67	529	625	459	341	120	2	2143
1979	30	323	392	291	326	25	0	1387
1980	10	227	534	279	242	122	0	1414
Total	120	1392	2450	2153	1279	648	2	8044
%	1	17	30	27	16	8	0	
Olive								
1977	3	179	1106	1788	409	167	23	3675
1978	117	997	1158	700	649	97	6	3724
1979	6	371	888	1149	790	57	0	3261
1980	6	219	703	592	310	100	0	1930
Total	132	1766	3855	4229	2158	421	31	12,590
%	1	14	31	34	17	3	.02	
Grand total								
	252	3158	6305	6382	3437	1069	31	20,634
%	1	15	31	31	17	5	.01	

Table 2. Monthly and yearly totals of *Conoderus amplicollis* (Gyllenhal) adults collected at black light traps, Riverside and Olive, California.

	June	July	Aug.	Sept.	Total
Riverside					
1977	0	6	56	5	67
1978	4	32	4	0	40
1979	17	30	5	4	56
1980	0	18	8	4	30
Total	21	86	73	13	193
%	11	45	38	6	
Olive					
1977	1	27	88	9	125
1978	20	142	28	12	202
1979	22	54	53	15	144
1980	9	26	6	0	41
Total	52	249	175	36	512
%	10	49	34	7	

Table 3. Monthly and yearly totals of *Conoderus falli* (Lane) adults collected at black light trap, Riverside, California.

	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1977	0	54	196	588	602	339	510	6	2295
1978	0	413	234	588	334	507	214	0	2290
1979	0	31	281	345	177	557	130	0	1521
1980	113	16	72	186	105	453	333	2	1280
Total	113	514	783	1707	1218	1856	1187	8	7386
%	1	7	11	23	16	25	16	.01	

1979 at both localities and the latest was September 26 at Riverside. It is interesting that the totals for the four year period show that 83% of the adults were collected in July–August at both localities. This elaterid species is not considered to be highly attractive to light.

The southern potato wireworm *Conoderus falli* is an important pest of vegetable crops in the southeastern United States (Day et al., 1971). It was first collected in California in 1963 in Deep Canyon near Palm Desert and in Riverside in 1966 (Stone, 1976b).

Over the four year period the highest adult catches were obtained in July and in September (Table 3). August and October totals were exceptionally high in 1977 but were lower in later years. Catches of adults were made as early as April 10, 1980 and as late as November 27, 1977. During the six year period of these studies no *C. falli* adults were collected in the trap located in an avocado grove at Olive.

Of the 3 species, *C. exsul* and *C. amplicollis* have spread the most rapidly and both have been found in 15 counties and as far north as Butte County. *Conoderus falli* is now present in four counties, namely Riverside, San Diego, Fresno, and Orange. In the absence of effective new soil insecticides or fumigants or with the present restrictions on the use of the older highly effective materials, these three species could become extremely hazardous to California vegetable and field crops.

#### Literature Cited

- Cockerham, K. L., and O. T. Deen. 1936. Notes on life history, habits and distribution of *Heteroderes laurentii* (Guér.). J. Econ. Entomol., 29:288–296.
- Day, A., F. P. Cuthbert, Jr., and W. J. Reid. 1971. The southern potato wireworm. Its biology and economic importance in coastal South Carolina. USDA Tech. Bull., 1443:1–33.
- Stone, M. W. 1975. Distribution of four introduced *Conoderus* species in California (Coleoptera: Elateridae). Coleopt. Bull., 29:163–166.
- . 1976a. Notes on the biology of the introduced elaterid *Conoderus exsul* (Sharp) (Coleoptera: Elateridae). Pan-Pac. Entomol., 52:304–310.

- . 1976b. The southern potato wireworm in California (Coleoptera: Elateridae). *Coleopt. Bull.*, 30:361–363.
- , and J. Wilcox. 1979a. The Gulf wireworm in California (Coleoptera: Elateridae). *Pan-Pac. Entomol.*, 55:235–238.
- , and ———. 1979b. Population build-up of two introduced *Conoderus* elaterid species in California (Coleoptera: Elateridae). *Coleopt. Bull.*, 33:473–475.

### Footnote

<sup>1</sup> Collaborators—USDA, SEA, AR. Boyden Entomological Laboratory. M. W. Stone, deceased March 28, 1982. J. Wilcox, deceased December 22, 1982.

### PUBLICATIONS RECEIVED:

Butterflies of the Rocky Mountain states. Edited by Clifford D. Ferris & F. Martin Brown. Published by The University of Oklahoma Press, xix, 442 pp., 4 col. pls., 26 figs., 321 maps, & many unnumbered figs. Publication date: October 1981. Published by The University of Oklahoma Press, 1005 Asp Avenue, Norman, Oklahoma 73019. Price: \$35.00 hardbound, \$15.95 softbound.

Community ecology of a coral cay. A study of One-Tree Island, Great Barrier Reef, Australia. By Harold Heatwole, Terence Done & Elizabeth Cameron. Published in *Monographie Biologicae*, Vol. 43, 400 pp., 99 figs., and 48 tables. Publication date: September 1981. Published by Dr. W. Junk BV Publishers, P.O. Box 13713, 2501 ES The Hague, The Netherlands. Price: Dfl. 170/US \$74.00 hardbound.

Ectoparasites of Hawaiian rodents (Siphonoptera, Anoplura and Acari). By JoAnn M. Tenorio & M. Lee Goff. Bishop Museum, Special Publication of the Department of Entomology, 32 pp., 19 figs. Publication date: December 1980. Published by Bishop Museum Press, P.O. Box 19000-A, Honolulu, Hawaii 96819. Price: \$4.00 softbound.

Scientific and common names of insects and allied forms occurring in Australia. By P. B. Carne, L. D. Crawford, M. J. Fletcher, I. D. Galloway, & E. Highley. Commonwealth Scientific and Industrial Research Organization, Australia, iii, 95 pp. Publication date: 1980. "Exclusive Distributor," ISBS, Inc., P.O. Box 1632, Beaverton, Oregon 97075. Price: \$6.00 softbound.

Paul H. Arnaud, Jr., *California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118.*